

Tahseenullah Khan, Mamoru Murata, M. Qasim Jan, Hafiz Ur Rehman, Muhammad Zafar, Hiroaki Ozawa, Anwar Qadir and Saqib Mehmood, 2016. Geochemistry and Tectonic Settings of Felsic Dykes in the Neoproterozoic Nagar Parkar Igneous Complex, SE Sindh, Pakistan. *Acta Geologica Sinica* (English Edition), 90(supp. 1): 124.

Geochemistry and Tectonic Settings of Felsic Dykes in the Neoproterozoic Nagar Parkar Igneous Complex, SE Sindh, Pakistan

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The Nagar Parkar complex consists of Neoproterozoic igneous and metamorphic rocks dissected by episodic mafic and felsic dykes. The latter can be classified broadly into porphyritic felsic dykes and aplitic felsic dykes (minor) intruding gray and pink granites at Nagar Parkar and the surrounding areas, and the orthophyric felsic dykes intruding amphibolites, deformed pink granites and the alkaline mafic dykes in the Dhedvero area north of Nagar Parkar. In the porphyritic felsic dykes, phenocrysts of perthite, quartz and albitic plagioclase occur in a groundmass of micrographic K-feldspar and quartz. Other minerals are alkali amphibole, biotite ± fluorite ± allanite ± tourmaline ± titanite, apatite and zircon. One of these dykes intruding gray and pink granites at Nagar Parkar yields ~800-700 Ma U-Pb zircon age. Geochemically, the porphyritic felsic dykes are subalkaline and demonstrate post-orogenic A2 type characteristic on Nb-Y-Ce and Nb-Y-3Ga ternary plots. The orthophyric felsic dykes illustrate orthophyric to trachytic textures. K-feldspar grains (dominant), plagioclase laths and quartz (minor) occur as phenocrysts in a fine-grained groundmass of nearly the same mineral composition. Other minerals include bluish-

green amphibole, biotite, epidote, rutile, titanite and zircon. These are alkaline and show trachytic and phonolitic composition when plotted on Zr/TiO₂ versus Nb/Y diagram. One of the samples of the orthophyric felsic dyke contains normative acmite and sodium metasilicate. The orthophyric felsic dykes display OIB- A1 type signatures. Mineral composition, and major and trace element analyses divide the porphyritic and orthophyric felsic dykes into subalkaline and alkaline A2 and A1 types of granitoids respectively, suggesting formation in two distinct tectonic regimes. The geochemical characteristics of the porphyritic felsic dykes show similarity with the gray and pink granites of the area, the acidic dykes of the Mount Abu, western Rajasthan in India, and the granites of the Seychelles micro-continent. The orthophyric felsic dykes show chemical resemblance with the Tavidar volcanic suite of western Rajasthan, and the Silhouette and North islands of the Seychelles micro-continent. This study confirms the spatial and temporal link among the Rodinian fragments exposed in the Nagar Parkar area of Pakistan, western Rajasthan of India and the Seychelles micro-continent.

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